

# इंटरनेट

# मानक

## Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 6650 (1972): Method for determination of residual thiosulphate and tetrathionate in processed photographic papers [CHD 5: Electroplating Chemicals and Photographic Materials]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE



*Indian Standard*

METHOD FOR THE DETERMINATION  
OF RESIDUAL THIOSULPHATE AND  
TETRATHIONATE IN PROCESSED  
PHOTOGRAPHIC PAPERS

UDC 771.531.2:543 [546.223.2]



© Copyright 1973

**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 1

January 1973

Gr 2

# Indian Standard

## METHOD FOR THE DETERMINATION OF RESIDUAL THIOSULPHATE AND TETRATHIONATE IN PROCESSED PHOTOGRAPHIC PAPERS

Photographic Chemicals and Related Materials  
Sectional Committee, CDC 44

### Chairman

### Representing

SHRI M. B. DESAI

Kesar Sugar Works Ltd, Bombay

### Members

SHRI D. C. SHAH (*Alternate to*  
Shri M. B. Desai)

Agfa-Gevaert India Ltd, Bombay

SHRI P. T. BHOPALE

Lunar Caustic Private Ltd, Poona

SHRI K. B. GADRE

Hindustan Photo Films Mfg Co Ltd, Ootacamund

DR S. K. JAIN

SHRI C. S. RAMANATHAN (*Alternate*)

Satyadev Chemicals Private Ltd, Baroda

SHRI SATYADEV MAYOR

SHRI P. NARAYANASWAMY

SHRI S. RAJENDAR (*Alternate*)

Gemini Colour Laboratory, Madras

SHRI R. PARIKSHIT

Directorate General of Technical Development,  
New Delhi

SHRI A. BANERJEE (*Alternate*)

Liberty Chemical Works, Bombay

SHRI S. K. PATEL

SHRI B. N. KONDA REDDI

Vijaya Productions Pvt Ltd, Madras

SHRI V. DINAKARA REDDI (*Alternate*)

DR A. RIEBEL

New India Industries Ltd, Bombay

SHRI K. C. SHETH

Filmcenter, Bombay

SHRI RAMESH TALWAR

Famous Cine Laboratories & Studios Ltd, Bombay

SHRI M. M. VAIDYA

Films Division (Ministry of Information & Broad-  
casting), Bombay

SHRI S. M. PATANKAR (*Alternate*)

Bombay Film Laboratories Pvt Ltd, Bombay

SHRI B. K. VISHWANATH

SHRI D. DAS GUPTA,

Director General, ISI (*Ex-officio Member*)

Director (Chem)

### Secretary

SHRI A. K. BHATTACHARYA

Deputy Director (Chem), ISI

(Continued on page 2)

**INDIAN STANDARDS INSTITUTION**

MANAK BHAVAN 9, BAHADUR SHAH ZAFAR MARG

NEW DELHI 1

( Continued from page 1 )

Photographic and Related Materials Subcommittee, CDC 44 : 4

*Convener*

DR S. K. JAIN

*Representing*

Hindustan Photo Films Mfg Co Ltd, Ootacamund

*Members*

SHRI C. S. RAMANATHAN ( *Alternate to*

Dr S. K. Jain )

SHRI V. N. BHATNAGAR

Gramophone Co of India Ltd, Bombay

SHRI P. T. BHOPALE

Agfa-Gevaert India Ltd, Bombay

SHRI P. C. MULAY

Bombay Film Laboratories Pvt Ltd, Bombay

SHRI B. K. VISHWANATH ( *Alternate* )

SHRI P. NARAYANASWAMY

Gemini Colour Laboratory, Madras

SHRI P. J. PATEL

ORWO Pvt Ltd, Bombay

SHRI B. N. KONDA REDDI

Vijaya Productions Pvt Ltd, Madras

SHRI V. DINAKARA REDDI ( *Alternate* )

DR A. RIEBEL

New India Industries Ltd, Bombay

SHRI RAMESH TALWAR

Famous Cine Laboratories & Studios Ltd, Bombay

SHRI M. M. VAIDYA

Films Division ( Ministry of Information & Broadcasting ), Bombay

SHRI S. M. PATANKAR ( *Alternate* )



# *Indian Standard*

## METHOD FOR THE DETERMINATION OF RESIDUAL THIOSULPHATE AND TETRATHIONATE IN PROCESSED PHOTOGRAPHIC PAPERS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 30 October 1972, after the draft finalized by the Photographic Chemicals and Related Materials Sectional Committee had been approved by the Chemical Division Council.

**0.2** Determination of the amount of residual thiosulphate in processed photographic paper prints is of interest in studies of thoroughness of fixation, rate, efficiency and effectiveness of washing, and in connection with the problems of image stability with respect to storage.

**0.3** The determination of tetrathionate which may be formed by mild oxidation of thiosulphate is of value in studies of 'hypo-eliminators' and also of interest in studies of image stability during storage. Tetrathionates (for example, sodium tetrathionate,  $\text{Na}_2\text{S}_4\text{O}_6$ ), like soluble thiosulphate, can cause sulphiding of the silver image during humid storage conditions.

**0.4** The method described in this standard is very sensitive, reasonably accurate, and convenient to use. It determines soluble or insoluble thiosulphate, together with any tetrathionate which may be present. The method is based on the ISO Recommendation, ISO/R 417-1965 'Methods for determining thiosulphate and tetrathionate in processed black and white photographic films, plates and papers'.

**0.5** In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS:2-1960\*.

---

### 1. SCOPE

**1.1** This standard provides a method for quantitatively determining the thiosulphate content of processed photographic paper prints. The method is intended for use in the selection of prints with reference to their probable permanency and in the control or evaluation of processing.

---

\*Rules for rounding off numerical values (*revised*).

1.2 The method given in this standard is also valid and preferable as a means for determining any residual thiosulphate (and tetrathionate) in prints which have been treated with hypo-eliminators. Thus, the effectiveness of a given hypo-eliminator can be determined.

## 2. PRINCIPLE OF THE METHOD

2.1 The test given in this standard depends upon the production of insoluble brown silver sulphide in the print itself by the quantitative reaction between the thiosulphate or tetrathionate and silver nitrate (silver ion) *occurring in situ*, when the print is bathed for 4 min in an acid solution, containing an excess of a soluble silver salt. To prevent possible subsequent darkening of the treated area, the treatment is followed by bathing in a solution of sodium chloride to completely convert the excess silver nitrate into insoluble white silver chloride, removing the silver chloride in a suitable fixing solution, and finally washing and drying. The transmission density of the treated area is then read.

2.2 The transmission density of the untreated area is read and subtracted from that of the treated area. The resulting value representing the transmission density of the silver sulphide is compared with the standard curve of Fig. 1 from which the corresponding equivalent content of thiosulphate or tetrathionate as  $\text{Na}_2\text{S}_2\text{O}_3$  in milligrams per  $5.0 \text{ cm}^2$  is found. The method is valid for papers for thickness between 0.07 mm and 0.48 mm.

## 3. SENSITIVITY OF THE TEST

3.1 With ordinary care, it is possible to determine quantities of thiosulphate in photographic prints as low as  $0.003 \text{ mg}/5.0 \text{ cm}^2$ , as  $\text{Na}_2\text{S}_2\text{O}_3$ . The visual threshold of the test appears to be about  $0.002 \text{ mg}/5 \text{ cm}^2$ .

## 4. TEST SOLUTIONS

4.1 The following solutions in stoppered bottles shall be kept for at least 6 months at  $20^\circ\text{C}$ . Unused solutions should be employed for each set of tests:

### *Solution A*

Water	750.0 ml
Acetic acid (glacial)	30.0 ml
Silver nitrate	10.0 g
Water to make in total	1.0 litre

Store in a brown or blackened glass-stoppered bottle away from strong light.

### *Solution B*

Water	750.0 ml
Sodium chloride	45.0 g
Water to make in total	1.0 litre



*Solution C*

Water	750.0 ml
Sodium sulphite (anhydrous)	15.0 g
Sodium thiosulphate (crystal-line)	45.0 g
Water to make in total	1.0 litre

**5. BLUE-GREEN (CYAN) FILTER**

**5.1** The blue-green (cyan) filter for use in making the visual transmission densitometric readings should be similar to one having the following transmission characteristics given in Table 1.

**TABLE 1 CHARACTERISTICS OF BLUE-GREEN FILTER**

WAVELENGTH m $\mu$ m	TRANSMITTANCE Percent	WAVELENGTH m $\mu$ m	TRANSMITTANCE Percent
(1)	(2)	(1)	(2)
400	0.44	510	50.9
410	0.36	520	42.1
420	0.63	530	30.5
430	3.63	540	18.6
440	13.1	550	8.99
450	25.4	560	3.59
460	36.5	570	0.80
470	46.5	580-680	Nil
480	53.6	690	0.18
490	56.8	700	1.60
500	55.8		

**6. PROCEDURE**

**6.1** To determine the thiosulphate (or tetrathionate) in the paper, a non-image portion (unexposed margin) at least 0.6  $\times$  2.5 cm in size is removed and approximately one-half of it dipped and allowed to remain submerged or the whole immersed\*, with occasional agitation, in an excess of Solution A for 4 min, then totally immersed with treatment successively in Solution B for 4 min and Solution C for 4 min, washed 5 to 10 min, and dried. In tests of batch washing, unexposed paper of the same mass and general size processed with the lot can be used to give representative tests, provided the agitation is uniform.

\*When print samples are totally immersed in Solution A, agitate them using rubber gloves, a glass rod or clean print tongs of inert material (stainless steel, plastic or lacquered wood), so as not to allow the silver nitrate solution to contact the hands, otherwise black silver stains will be produced.

**6.2** After the preparation of the print samples for indication of thiosulphate, the transmission densities of corresponding treated and untreated samples are determined by means of a visual transmission densitometer. All readings for the purpose of this standard are made using a suitable blue-green (cyan) filter, placed over the eyepiece of the densitometer. The filter should be similar to that described in 5. If other types, such as photoelectric densitometers, are employed, specific calibration curves should be determined.

**6.3** The difference between the density readings of the treated and untreated areas is the visual transmission density (through the filter) of the silver sulphide produced by the thiosulphate (or tetrathionate) in the paper and is a quantitative measure of the thiosulphate which the paper contained. The corresponding thiosulphate content in terms of anhydrous sodium thiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3$ ) in milligrams per  $5.0 \text{ cm}^2$  is obtained by reference to the standard curve in Fig. 1.

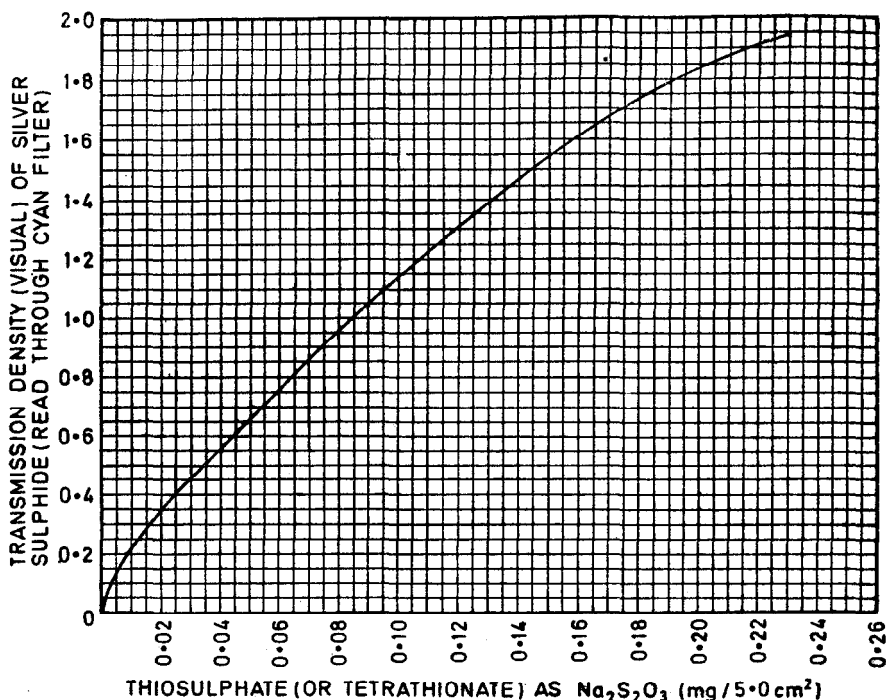


FIG. 1 STANDARD CURVE OF CONTENT OF THIOSULPHATE OR TETRATHIONATE

## INDIAN STANDARDS

ON

## PHOTOGRAPHIC CHEMICALS

IS:

- 246-1972 Sodium thiosulphate, crystalline (*third revision*)  
247-1972 Sodium sulphite, anhydrous (*third revision*)  
248-1971 Sodium bisulphite (sodium metabisulphite) (*second revision*)  
332-1967 Chromium potassium sulphate (chrome alum) (*first revision*)  
388-1972 Hydroquinone, photographic grade (*second revision*)  
500-1972 Potassium metabisulphite, photographic grade (*second revision*)  
557-1968 Sodium acetate, technical and photographic (*first revision*)  
2211-1972 Anhydrous sodium thiosulphate, photographic grade (*first revision*)  
2318-1963 Silver nitrate, photographic grade  
2797-1964 Potassium bromide  
4173-1967 4-methylaminophenol sulphate  
5379-1969 Ammonium thiosulphate, photographic grade  
5380-1969 Sodium bromide, photographic grade  
5381-1969 Quantity packaging of sensitized photographic materials  
5431-1969 Motion picture safety films  
6139-1971 Sizes of photographic paper for general use  
6212-1971 Method for determination of residual thiosulphate in processed black and white photographic films and plates

---

## INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 1

Telephone : 27 01 31 ( 20 lines )

Telegrams : Manaksanstha

### Branch Offices:

' Sadhna ', Nurmohamed Shaikh Marg, Khanpur  
F Block, Unity Bldg, Narasimharaja Square  
534 Sardar Vallabhbhai Patel Road  
5 Chowringhee Approach  
5-9-201/2-A ( First Floor ), Chirag Ali Lane  
117/418 B Sarvodaya Nagar  
54 General Patters Road

### Telephone

Ahmedabad 1	2 03 91
Bangalore 2	2 76 49
Bombay 7	35 69 44
Calcutta 13	23-08 02
Hyderabad 1	5 34 35
Kanpur 5	82 72
Madras 2	8 72 78